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The Diagnosis and Treatment of Epidemic Poliomyelitis

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DIAGNOSIS

Detailed history and physical examination are essential for diagnosis, which depends equally on eliciting the characteristics of poliomyelitis and on excluding other diseases which may have superficially similar manifestations.

The complete course of poliomyelitis begins with an *onset stage* of nonspinal symptoms (falsely called "systemic" since they are not due to invasion of the blood stream) followed immediately or sometimes after an asymptomatic interval by an *irritative stage* in which so-called meningeal symptoms predominate; this is followed in turn by a *paralytic stage*. The disease may and often does fail to progress beyond the first or second stage and in such cases is called *nonparalytic*. In all stages, alterations of the spinal fluid occur.

The *onset stage* is marked by *fever,* usually not high, which is constant, and by other symptoms none of which is constant. Among these is *vomiting,* usually unrelated to food or meals and occurring only once or a few times. Nausea without vomiting, and loss of appetite, are often present. *Headache,* frontal or occipital, is common. The *mental state* is one of full consciousness but marked by apathy, sometimes drowsiness alternating with irritability or apprehensiveness. Sleep is apt to be disturbed. The absence of convulsions or minor clonic movements, of opisthotonos and clouding of consciousness indicative of cortical irritation is important in differentiating encephalitis and meningitis. The face is often flushed and the pharynx hyperemic. General hypertension and sweating occasionally occur. Physical examination at this stage reveals little else. The reflexes are usually present, equal and lively. There may be a moderate leucocytosis; more often the bood count is normal. If lumbar puncture is done at this stage, the pressure is usually normal, the protein moderately increased and the cells usually increased, with leucocytes predominating. Occasionally there is no pleocytosis.

The second, *irritative* stage, may follow the onset so rapidly as to merge with it or there may be a delay of one to twelve days during which the patient appears to be well (so-called "dromedary" form). Fever continues or recurs, as may other symptoms seen at the onset. Flexion of the neck is resisted (although the head can be readily moved sidewise) and also, in many cases, flexion of the spine ("spine sign"). Kernig's sign is sometimes present, usually only when there is pain or tenderness in the legs. Localized skin hyperesthesia or tenderness to deep pressure, sometimes with localized sweating, occurs and should be carefully looked for since it often indicates the localization of future paralysis. A coarse tremor, best seen in the arms or hands when the patient holds them away from the body, is very common. The skin and tendon reflexes at this time are usually still present but inequalities often develop and should be carefully watched for. The spinal fluid now nearly always shows an increase of cells, usually under 500, lymphocytes usually predominating, but rarely more than 80 per cent, with increase of protein, and a normal value for sugar. The pressure is not much increased over normal limits.

The third, or paralytic, stage is generally first manifested by localized weakness in one or more areas which are characteristically asymmetrical. The reflexes in the corresponding area are diminished and then lost. Hyperesthesia or tenderness often have the same segmental distribution. Weakness and paralysis may involve any level of the neuraxis containing lower motor neurons. Among the cranial nerves, however, involvement above the sixth is relatively uncommon. Bulbar poliomyelitis most frequently involves the seventh, ninth and perhaps the twelfth nerves, giving rise to facial, pharyngeal and nuchal weakness. Facial paralysis is generally of the nuclear type in which the muscles of both upper and lower facial segments are implicated. Pharyngeal paralysis is frequently but not always unilateral, leading to failure of the side of the soft palate to rise on phonation, to difficulty in swallowing with escape of ingested fluid through the nose, and to accumulation of saliva in the pharynx with choking. Weakness of the flexors of the neck is very common in the early part of the paralytic stage and is easily shown by inability to raise the head from the pillow; or by falling back of the head when the shoulders are lifted by the examiner.

In the parts of the body supplied by the spinal cord, the lower extremities are most commonly involved and particularly the quadriceps, anterior tibial and peroneal groups. Any muscle group in any extremity or in the trunk may, however, be implicated and involvement of the cervical and thoracic segments is of special importance because of the seriousness of respiratory paralysis (diaphragm and intercostals). It is of great importance to detect these early in order that the patient may have the benefit of the respirator as soon as possible.

As a general rule paralysis reaches its maximum within a very few days after its onset; the fever then declines by rapid lysis and the extent and severity of paralysis gradually diminish, in some cases with practical restitution of complete function. In the majority, some degree of residual weakness and atrophy persists. The details of the survey of muscular function throughout the body, which should be carried out in every case, are too lengthy to be given here. They can be found in the larger texts and special manuals.

During the acute stages, the diagnosis of poliomyelitis, though often simple in epidemics, should not be made too hurriedly. Too many mistakes have been made at all times and between epidemics the diagnosis of the sporadic case is often very difficult. The various forms of nonpoliomyelitic encephalitis are especially troublesome. Some of them, such as St. Louis and measles encephalitis, may even cause flaccid paralysis. In general, however, localized paralysis of the lower motor neuron accompanying an acute febrile illness is the distinguishing clinical mark of poliomyelitis.

The history is of great importance to determine recent acute communicable disease (measles, mumps, chickenpox, rubella, diphtheria) or exposure to it. Recent vaccination is also important in ruling out postvaccinal encephalitis. Clinically, the encephalitides are characterized, as their name implies, by involvement of the brain cortex or subcortical areas and clinically, by the occurrence of clouding of consciousness to a greater or less extent, and convulsive manifestations. Sometimes, there are paralyses of the cranial nerves, especially of the ocular muscles, which in poliomyelitis (with the exception of the abducens) these are not often implicated. The changes in the spinal fluid, in mild forms of the virus encephalitis are not essentially different from those in poliomyelitis and do not help in differential diagnosis. In mumps meningoencephalitis, however, the cells are nearly all mononuclear.

Bacterial meningitis with its higher fever, active spasm of the neck and back (retraction of the head and opisthotonus are rare in poliomyelitis), clouding of consciousness, strongly positive Kernig, is usually not hard to distinguish but in some cases may be extremely so. The spinal fluid pressure is generally higher, the pleocytosis and protein content greater, the sugar lower, and bacteria can normally be found by direct smear or culture. Tuberculosis meningitis in its early stages is sometimes very difficult to differentiate. The greater pressure, the greater proportion of lymphocytes (usually 90 per cent or more), the low sugar content and the presence of sufficient fibrin to form a pellicle on standing are important points and the finding of tubercle bacilli, which is nearly always possible if painstaking search is carried out, is decisive. It is helpful at times to have an X-ray examination of the chest made for the presence of the ''snow-storm'' appearance of miliary tuberculosis.

Peripheral paralyses from diphtheria, Jamaica ginger intoxication, botulism, lead or other heavy metal poisoning, beri-beri, serum injections (especially tetanus antitoxin) are mostly not accompanied by fever and should be ruled out by a careful history. Trauma, osteomyelitis, acute arthritis, rheumatic fever and even active epiphyseal syphilis may lead to confusion because of pain and pseudoparalysis. In these and some other rarer conditions, a careful history and physical examination will usually rule out poliomyelitis. During times of epidemic when every febrile illness is suspected of being infantile paralysis, it is incumbent on the physician to guard against overlooking the presence of another disease, perhaps as serious.

EARLY PROCEDURES IN THE TREATMENT OF POLIOMYELITIS

In the early stage of infection, when the available evidence supports the probability of the diagnosis, certain measures should always be promptly instituted. The patient should be carefully isolated for the protection of the community. The communicability is low; but the disease almost certainly spreads through contact, and it can hardly be doubted that contagiousness is greater at the onset than at any subsequent time. The patient should be placed under conditions which absolutely protect him from muscular and nervous fatigue; he should be made as comfortable as possible and should be subjected to the minimum of examination necessary to observe his progress. Fatigue is an important matter in increasing susceptibility to the disease, and its avoidance in the early stage of the infection best serves to cut down the extent of subsequent paralytic development. Whatever may be expected from specific therapy can best be secured only at this time.

As the disease progresses, the onset of paralysis may be most insidious, and is overlooked with surprising frequency. It is good practice to anticipate common forms of weakness by providing some support for the arms and feet. The arms may be supported on pillows in a position of abduction and slight external rotation, which spares the deltoids and the rotators of the arm. The feet may be supported with pillows or sand bags as partial protection against the insidious development of foot drop.

(Continued in next issue.)

By study man produced the stone tool, the bow and arrow, the numerals, and the alphabet. Likewise tillage, books, and all else by which he lifted himself out of savagery. Among his great works—poems, commerce, and government—each is a creation of the mind. The structures in which man resides, works, and escapes the pelting elements, the conveyances in which he travels, are but mental reflections that have taken tangible form.

THE PUBLIC HEALTH NURSE VIEWS HER CRIPPLED CHILDREN'S CASE LOAD

(Continued from last issue.)

Few training schools have emphasized functional anatomy or stressed orthopedic nursing in the past. Realizing the need for better basic preparation in this phase of nursing, the committee which prepared the revised "Curriculum Guide," outlined a unit on "Nursing in Conditions of the Musculo-Skeletal System." Integration of the material in this unit with other related subjects in the total curriculum should better equip future nurses to meet the needs of the crippled child.

For the last three years, all training schools in California have taught a unit on orthopedic nursing. The majority of the schools give from ten to 20 hours to this subject and some of the courses include a certain amount of physiotherapy.

It is not expected that each nurse will be a specialist in all fields. It is humanly impossible to know everything about the maternity cycle, child hygiene, tuberculosis, the school child and all other phases of nursing. After all it is the child as a *whole* who should be considered, it is the *baby* who was born with a cleft lip or the *preschool* child who pulled the hot apple sauce over on him rather than a "cleft lip case" or a "burn case" with which we are concerned.

When the nurse possesses an appreciation of the interrelationship of a given child and the family group, and is sensitive to the implications presented in a given visit, there is every reason to believe a valuable contribution can be made to each field of public health nursing. To aid her in meeting special problems, she must know sources from which she can obtain help—another nurse, her supervisor, the health officer, a family doctor or literature. She must also know community and state resources and use them.

Consultant service in orthopedic nursing is provided to public health nurses through the State Department of Public Health.

Although it is not possible to reach all public health nurses directly, it is hoped that through the district supervising nurses it will be possible to create a better understanding of the ways public health nurses can aid in services to crippled children.

Every nurse who wishes to do the most in her power for the families she serves, will make a sincere effort to augment her present knowledge, particularly in the field in which her basic preparation is weak. If this field is in orthopedic nursing, it would be advisable to make up the deficiency in a post graduate course. Until that time, with sincere interest and the will to do, there is much she can contribute to crippled children.

MORBIDITY

Complete Reports for Following Diseases for Week Ending September 9, 1939

Chickenpox

50 cases: Alameda County 1, Alameda 1, Berkeley 3, Oakland 7, Contra Costa County 1, Humboldt County 1, Compton 2, Los Angeles 7, Whittier 1, King City 1, Corona 1, Sacramento 2, San Francisco 17, Santa Barbara 1, Palo Alto 1, Siskiyou County 1, Sutter County 1, Tulare County 1.

Diphtheria

13 cases: Oroville 2, Fresno 1, Los Angeles County 2, Los Angeles 6, San Francisco 1, San Jose 1.

German Measles

8 cases: Kern County 1, Los Angeles County 2, Long Beach 1, Whittier 1, Santa Ana 1, San Diego 1, Redwood City 1.

Influenza

11 cases: Los Angeles 4, Pasadena 1, Pomona 1, San Francisco 2, Burlingame 1, Santa Rosa 2.

Malaria

7 cases: Sacramento County 2, Sacramento 1, Winters 2, Yuba County 1, California 1.*

Measles

25 cases: Crescent City 1, Fresno County 1, Humboldt County 1, Arcata 1, Long Beach 1, Los Angeles 5, Mendocino County 3, Sacramento 1, San Diego County 1, San Diego 1, San Francisco 2, San Joaquin County 1, Stanislaus County 1, Sutter County 1, Ventura County 4.

Mumps

91 cases: Alameda County 3, Berkeley 1, Oakland 9, Fresno 1, Los Angeles County 2, Long Beach 2, Los Angeles 7, Santa Monica 1, Maywood 2, Marin County 1, Mill Valley 2, San Rafael 1, Sausalito 4, Mono County 1, Monterey County 1, Orange County 1, Riverside County 1, Sacramento 3, San Diego 2, San Francisco 10, Stockton 2, Burlingame 1, San Mateo 2, Santa Barbara County 1, Santa Clara County 4, Palo Alto 14, San Jose 2, Vallejo 1, Stanislaus County 6, Yolo County 2, Yuba County 1.

Pneumonia (Lobar)

31 cases: Alameda County 1, Berkeley 1, Oakland 2, Fresno 2, Los Angeles County 6, Long Beach 1, Los Angeles 6, Santa Monica 1, Monterey County 2, San Francisco 1, San Joaquin County 1, Stockton 3, San Luis Obispo County 1, Tehama County 1, Tulare County 1, Woodland 1.

Scarlet Fever

52 cases: Berkeley 3, Oakland 2, Humboldt County 1, Kern County 2, Los Angeles County 6, Burbank 1, Glendale 1, Huntington Park 2, Los Angeles 18, Pomona 1, Madera County 3, San Rafael 1, Orange County 1, Riverside 1, San Diego County 1, San Francisco 2, San Jose 1, Stanislaus County 1, Modesto 2, Tulare County 1, Yolo County 1.

Smallpox

7 cases: Placer County 6, Sacramento County 1.

Typhoid Fever

18 cases: Fresno County 3, Los Angeles 2, San Fernando 1, Merced 1, Indio 1, San Diego 2, San Luis Obispo County 1, Siskiyou County 1, Stanislaus County 5, Modesto 1.

Whooping Cough

83 cases: Berkeley 1, Oakland 9, Fresno 2, Kern County 2, Los Angeles County 16, Long Beach 3, Los Angeles 9, Lynwood 2, Monterey Park 3, Orange County 2, Santa Ana 2, Banning 3, Elsinore 7, Sacramento 1, Redlands 1, San Diego 6, Manteca 3, Santa Barbara County 3, San Jose 2, Stanislaus County 1, Tulare County 1, Ventura County 1, Oxnard 2, Winters 1.

Meningitis (Epidemic)

One case: Kern County.

Dysentery (Amoebic)

2 cases: Ontario 1, Sonoma County 1.

Dysentery (Bacillary)

28 cases: Berkeley 2, Eureka 1, Bakersfield 1, Los Angeles County 1, Los Angeles 1, Shasta County 12, Redding 6, Sonoma County 2, Yolo County 2.

Poliomyelitis

45 cases: Oakland 2, Contra Costa County 1, Walnut Creek 1, Fresno County 5, El Centro 1, Kern County 4, Susanville 1, Los Angeles County 2, Glendale 1, Los Angeles 6, Pasadena 2, Santa Monica 2, South Pasadena 1, South Gate 1, Maywood 1, Madera County 1, Madera 1, Chowchilla 1, Merced County 1, Riverside 1, Sacramento 1, San Diego 2, Santa Clara County 1, San Jose 1, Stanislaus County 3, Tulare County 1.

Tetanus

One case: Fresno County.

Trachoma

4 cases: Fresno 2, Los Angeles 1, Tulare County 1.

Encephalitis (Epidemic)

8 cases: Kern County 1, Madera County 1, Chowchilla 1, Merced County 1, Burlingame 1, Modesto 1, Sutter County 2.

Paratyphoid Fever

One case: San Francisco.

Trichinosis

2 cases: Oakland 1, San Bernardino 1.

Food Poisoning

24 cases: Los Angeles 17, Bell 2, San Francisco 3, Manteca 2.

Undulant Fever

6 cases: Los Angeles County 1, Los Angeles 2, Tustin 1, Riverside 1, San Bernardino 1.

Tularemia

One case: Lassen County.

Coccidioidal Granuloma

One case: Kern County.

Septic Sore Throat

4 cases: Oroville 2, Madera County 1, Madera 1.

Relapsing Fever

One case: Fresno County.

Rabies (Animal)

9 cases: Oakland 1, Fresno County 1, Kern County 1, Los Angeles 3, Orange County 1, San Mateo County 1, Yuba County 1.

Two principles govern the moral and intellectual world. One is perpetual progress, the other the necessary limitations to that progress. If the former alone prevailed, there would be nothing steadfast and durable on earth, and the whole of social life would be the sport of winds and waves. If the latter had exclusive sway, or even if it obtained a mischievous preponderancy, everything would petrify or rot. The best ages of the world are those in which these two principles are the most equally balanced. In such ages every enlightened man ought to adopt both principles, and with one hand develop what he can, with the other restrain and uphold what he ought.—Gentz.

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* Cases charged to "California" represent patients ill before entering the state or those who contracted their illness traveling about the state throughout the incubation period of the disease. These cases are not chargeable to any one locality.

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